IB/2005/050217

Europäisches Patentamt | European Patent Office | Office européen des brevets

Bescheinigung Certificate Attestation

Die angehefteten Unterlagen stimmen mit der ursprünglich eingereichten Fassung der auf dem nächsten Blatt bezeichneten europäischen Patentanmeldung überein.

The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

Patentanmeldung Nr. Patent application No. Demande de brevet n°

04100178.5

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk

DEN HAAG, DEN
THE HAGUE, 23/01/04
LA HAYE, LE

Europäisches Patentamt
European Patent Office
Office européen des brevets

Blatt 2 der Bescheinigung
Sheet 2 of the certificate
Page 2 de l'attestation

Anmeldung Nr.:
Application no.: 04100178.5
Demande n°:

Anmeldetag:
Date of filing: 21/01/04
Date de dépôt:

Anmelder:
Applicant(s):
Demandeur(s):
Koninklijke Philips Electronics N.V.
5621 BA Eindhoven
NETHERLANDS

Bezeichnung der Erfindung:
Title of the invention:
Titre de l'invention:
RF communication system and method

In Anspruch genommene Priorität(en) / Priority(ies) claimed / Priorité(s) revendiquée(s)

Staat: State: Pays:	Tag: Date: Date:	Aktenzeichen: File no. Numéro de dépôt:

Internationale Patentklassifikation:
International Patent classification:
Classification internationale des brevets:
/

Am Anmeldetag benannte Vertragstaaten:
Contracting states designated at date of filing:
Etats contractants désignés lors du depôt: AT/BG/BE/CH/CY/CZ/DE/DK/EE/ES/FI/FR/GB/GR/HU/IE/IT/LI/LU/MC/

Bemerkungen:
Remarks:
Remarques:

RF communication system and method

The present invention relates to an RF communication system and to a corresponding method for control of user devices via a wireless RF communication. The present invention relates further to a user device for reading user settings and/or commands from a passive data carrier via a wireless RF communication and to a passive, via a wireless RF communication programmable and readable data carrier.

Radio frequency identification (RFID) tags are known and widely used to identify an object or a location. The state of a device containing a reader depends on the detection of specific tags. An application of such RFID tags is, for instance, described in US 2002/0039896 A1 disclosing a system for disabling mobile telephones in circumstances where the use would prejudice the operation of critical systems (e.g. on an aeroplane or in a hospital), or would irritate others. It includes a pair of RF beacons (active RFID tags) situated at the entrance of the controlled zone. The phone has receivers sensitive to the beacon outputs, and is adapted automatically to shut down into a stand-by state when passing in one direction through the beacons, and to re-activate when passing in the other direction. Thus, by use of the active RFID tags a specific command identification stored therein is transmitted to the phone to switch it into a particular operational mode.

The problem with the known applications is that the device including the detector or receiver for detecting/receiving the command from the RFID tag needs to know beforehand what to make of the detected or received signal from a specific RFID tag or, more generally, a specific data carrier which can be programmed and read via a wireless RF communication. The device needs to know the data carrier and must be told the settings associated with that data

carrier, i.e. each device needs to be trained before it will exhibit the desired functionality.

It is an object of the present invention to provide an RF communication system and method by which an extensive training of different user devices can be avoided. Further, an appropriate user device and a passive data carrier for use in such a RF communication system shall be provided.

The object is achieved according to the present invention by an RF communication system as claimed in claim 1 comprising:

- a user device for reading user settings and/or commands from a passive data carrier via a wireless RF communication including a controller for controlling the user device according to read user settings and/or commands and a programming unit for automatically programming said passive data carrier via a wireless RF communication with actual user settings and/or commands of the user device, and
- a passive, via a wireless RF communication programmable and readable data carrier including a memory for storing user settings and/or commands.

A corresponding RF communication method is defined in claim 7 comprising the steps of:

- automatically programming a passive data carrier via a wireless RF communication with actual user settings and/or commands of a user device, said passive data carrier including a memory for storing said user settings and/or commands,
- reading user settings and/or commands from said passive data carrier via a wireless RF communication, and
- controlling the user device according to read user settings and/or commands.

An appropriate user device for use in a RF communication system according to the invention is defined in claim 8 comprising:

- an RF transmitter for emitting RF signals,
- a programming unit for automatically programming said passive data carrier via

said RF signals with actual user settings and/or commands of the user device,

- a detector for detecting RF signals or RF signal modulations of the emitted RF signals from said data carrier,

- a processor for processing the detected RF signals or RF signal modulations and for deriving user settings and/or commands embedded therein, and

- a controller for controlling the user device according to read user settings and/or commands.

A passive, via a wireless RF communication programmable and readable data carrier according to the present invention is defined in claim 9 comprising:

- a memory for storing user settings and/or commands,

- a receiving means for receiving RF signals,

- a processing means for processing said received RF signals to obtain user setting and/or commands embedded therein and/or for embedding stored user settings and/or commands into output RF signals or RF signal modulations of said received RF signals, and

- an output means for outputting said output RF signals or RF signal modulations.

The present invention is based on the idea to store user settings and/or commands in the passive data carrier. The passive data carrier then communicates stored commands and/or settings to the user device being within its control area, which device then executes the commands or is controlled according to the read user settings. The data carrier can, for instance, be embedded in the environment, e.g. sealed into a wall, and the user device generally can be any portable or mobile device, such as a mobile phone, a camera, an audio or video device or any other device for domestic appliance.

The programming of the passive data carrier by the user settings and/or commands is done automatically and implicitly, for instance by communicating the present state, e.g. the volume level and the tuned radio station of an audio device, to the passive data carrier when entering its control area or when changing the state. Next time the same device (or the same type of device) enters the control

area these user settings and/or commands will then be read by the user device which is then automatically controlled to get into the same state.

The selective execution of the transmitted command and/or user settings can be made dependent on the detection of a specific passive data carrier. Thus, commands and/or user settings can be targeted to a specific user device, e.g. the settings and/or commands only apply to the user device that left the user settings and/or commands, or a specific group of devices, e.g. all devices of a particular user.

By the invention it is thus not required to pre-program all user devices by specific commands to be executed when a user device enters the control zone of a particular passive data carrier. Instead, user settings and/or commands are pre-programmed or programmed during use into the data carriers, and the user devices are adapted for being controlled according to such user settings and/or commands which are directed to them.

Preferred embodiments of the invention are defined in the dependent claims. For enabling an explicit programming of a passive data carrier a separate programming device is provided according to a preferred embodiment which comprises an input means for inputting user settings and/or commands. In addition, also the user device may comprise such input means in order to enable the user to explicitly program a passive data carrier via a user device.

The passive data carrier can generally be any data carrier which is programmable and readable via a wireless RF communication. Preferably, a passive RFID tag is used comprising:

- a receiving means for receiving RF signals,
- a processing means for processing said received RF signals to obtain said user setting and/or commands embedded therein and/or for embedding stored user settings and/or commands into output RF signals or RF signal modulations of said received RF signals, and

- an output means for outputting said output RF signals or RF signal modulations.

Such passive RFID tags operate without a separate external power source and obtain operating power generated from the reader. Passive RFID tags are thus much lighter than active tags, less expensive, and offer a virtually unlimited operational life time. Generally, the read range, i.e. the control zone controlled by such a passive RFID tag, is several meters, for instance 10m. The general layout and function of such passive RFID tags is commonly known in the art and shall not be explained further here.

User devices particularly adapted for use with such RFID tags comprise:

- an RF transmitter for emitting RF signals,
- a detector for detecting RF signals or RF signal modulations of emitted RF signals,
- a processor for processing the detected RF signals or RF signal modulations and for deriving user settings and/or commands embedded therein.

As already mentioned not only one particular command or user setting can be stored in a passive data carrier but different sets which are provided for control of different types, groups or items of user devices. This enables a wide use of the invention for a number of different applications.

In a preferred application a plurality of passive data carriers positioned at different locations for control of user devices present in respective control areas around said different locations according to stored user settings and/or commands are provided. For instance, a number of such passive data carriers, e.g. RFID tags, can be located at the walls of a room all storing the same user settings and/or commands, while all data carriers located in another room store a different set of user settings and/or commands.

The invention will now be explained in more detail with reference to the drawings in which

Fig. 1 illustrates the basic use of the invention,

Fig. 2 shows a block diagram of a passive data carrier according to the invention,

Fig. 3 shows a block diagram of a user device according to the present invention, and

Fig. 4 shows a block diagram of a programming device according to the present invention.

Fig. 1 schematically shows the use of the present invention. As an example two rooms 1, 2 are shown, both provided with one or more RFID tags 3, 4, 5. The read range, i.e. the control zone, of the RFID tags 3, 4, 5 is adapted such that the complete room 1 lies within the control zone of the tag 3, and that the complete room 2 lies within the control zone of tags 4 and 5. Further, two user devices, in particular a mobile phone 6 and an audio device 7, are exemplary shown. For explicit programming of the tags 3, 4, 5 a programming device 8 is provided. Details of the tags 3, 4, 5 and the devices 6, 7, 8 will be explained below with reference to Figs. 2 to 4. While in Figs. 2 and 3 block diagrams of the tag 3 or the user device 6, respectively, are shown as examples, the other tags 4, 5 or the other user device 7, respectively, have the same or similar structure.

According to the present invention user settings and/or commands are stored in a storage unit 31 (see Fig. 2) of the tag 3. The storage unit 31 can be separated into sub-units for storage of different sets of user settings and/or commands provided for different types, groups or items of user devices. For instance, there can be a sub-unit storing user settings and/or commands for mobile phones and a different sub-unit for storing user settings and/or commands for audio devices. Still further, a sub-unit can be provided for storing user settings/commands for a particular user device of a particular user. Alternatively, different tags are used for

different devices, device types, groups of devices, users, user types, user groups, since the tags are supposed to be cheap.

When a user device, for instance as shown in Fig. 1 the mobile phone 6, enters the room 1, i.e. the control zone of the tag 3, the receiver 32 of the tag 3 receives RF signals emitted by an RF transmitter 61 of the device 6. For instance, the transmitter 61 continuously generates an RF carrier sine wave, which is used to transmit energy to the passive RFID tag and retrieve data therefrom. These sine waves are induced into the receiver 32, generally a wound or printed coil. Once the tag 3 has received sufficient energy to operate correctly, it divides down the carrier and begins clocking its data stored in the memory 31 to an output unit 33, generally an output transistor which is normally connected across the coil input. The tag's output transistor shunts the coil, sequentially corresponding to the data which is being clocked out of the memory 31, which causes a momentary fluctuation (dampening) of the carrier wave, which is seen as a slight change in amplitude of the carrier, i.e. RF signal modulations are preferably effectuated.

A detector 62 of the user device 6 is able to peak-detect the amplitude-modulated data which can then be processed by a processing unit 63. In particular, user settings and/or commands embedded in the detected RF signal modulations, which are directed for use by this particular user device 6, are retrieved therefrom and provided to a controller 64 for control of the user device 6.

For instance, the data stored in the memory 31 of the tag 3 may include the command that any mobile phone 6 being in the control zone of the tag 3 shall be switched to vibration mode instead of the normal ring mode since any disturbing noise shall be avoided in this room 1, being for instance an exhibition room of a museum or a church. The controller 64 can further be adapted such that the mobile phone 6 returns back to the previous operational mode when it leaves the control zone of the tag 3, i.e. when it leaves the room 1.

The user device 6 is further provided with a programming unit 65 for programming tags and an input unit 66 for inputting user settings and/or commands for control of the user device 6. For instance, when entering the room 1 or when already being within the room 1, the user of the mobile phone 6 may switch the phone 6 to vibration mode or completely switch the phone 6 off manually by use of the mobile phone's terminal. This state will then automatically be programmed into the tag 3 by use of the programming unit 65, in particular by transmitting RF signals by the transmitter 61. These RF signals carry an appropriate information, which can be detected by the receiver 32 and processed by a processing unit 34 of the tag 3 in order to be stored in the memory 31. The mobile phone 6 may then be removed from the room 1 and brought into another state at another location, for instance in the room 2 the mobile phone 6 is again switched on or switched into normal operational mode. Upon the return of the mobile phone 6 back to room 1 again the last state of the mobile phone 6 still stored in the memory 31 will be detected causing it to revert to the programmed setting for this room 1, i.e. the mobile phone 6 is again automatically switched off or switched to vibration mode, respectively.

Also, if another similar device, i.e. another mobile phone, is brought into the room 1, it will interprete the detection of the programmed tag as a command to get into the state left by the previous mobile phone 6 in the tag 3.

In another scenario, for instance in room 2, which may be a sleeping room, the tags 4, 5 may be programmed to set a maximum volume command. Each user device, for instance the audio device 7, entering the room 2 will then read out the tags 4, 5 (or at least one of the tags, both storing the same data) and the maximum volume command will cause the audio device 7 to reduce the volume to the stored maximum level.

In another embodiment tags in the entrance of a church may comprise a special serial number, which has been defined in a standard/specification for mobile phones as silent command. Each mobile phone of a person entering the

church will read out the serial number and change to silent mode until the special serial number of a tag sealed in the wall at the exit will turn the mobile phone to normal mode again.

As will be clear from the last two examples there will be portions of data stored in the memory of a tag which can be changed by a user or a user device, while other parts (for instance the maximum volume command or the silent mode command) can not be changed.

In addition to the user devices 6 and 7, there may also be provided a separate programming devices 8 comprising a transmitter 81, a processor 82 and an input unit 83 similar and having the same function as in the user device 6. By such a programming device 8 certain user settings or commands, for instance the silent mode command in the last example, can be explicitly programmed into particular tags.

Other examples for use of the invention include the setting up of a synchronization zone. The command communicated by the tag may be used to initiate a synchronization procedure. Such a set up is expected to be less complex and use less power than the continuous scanning of the environment by a user device to detect synchronization opportunities. The alternative is that the user always initiates the synchronization himself. This embodiment also makes selective initiation of the synchronization procedure possible by attaching an identifier to the command, e.g. a particular mobile device only initiates synchronization if it detects a particular assigned identifier in combination with the synchronisation command.

The proposed invention of programming passive data carriers, in particular passive RFID tags provides a flexible use and a wide range of applications. Desired user settings and/or commands can be specified and stored in the tag, and all other user devices can read it, not only the one user device that stored the information, but all other user devices to which it is directed. Commands or user

settings for other types or instances of devices can be left, and it is not required to program the response to a specific identifier into the user devices that need to respond to the tag. In particular, an extensive training of user devices is not required according to the present invention.

Claims:

1. RF communication system for control of user devices via a wireless RF communication comprising:

- a user device (6, 7) for reading user settings and/or commands from a passive data carrier (3, 4, 5) via a wireless RF communication including a controller (64) for controlling the user device (6) according to read user settings and/or commands and a programming unit (65) for automatically programming said passive data carrier (3, 4, 5) via a wireless RF communication with actual user settings and/or commands of the user device (6, 7), and
- a passive, via a wireless RF communication programmable and readable data carrier (3, 4) including a memory (31) for storing user settings and/or commands.

2. RF communication system as claimed in claim 1,

further comprising a programming device (8) having an input means (83) for inputting user settings and/or commands for explicitly programming said passive data carrier (3, 4, 5).

3. RF communication system as claimed in claim 1,

wherein said passive data carrier (3, 4, 5) is a passive RFID tag further comprising:

- a receiving means (32) for receiving RF signals,
- a processing means (34) for processing said received RF signals to obtain said user setting and/or commands embedded therein and/or for embedding stored user settings and/or commands into output RF signals or RF signal modulations of said received RF signals, and
- an output means (33) for outputting said output RF signals or RF signal modulations.

4. RF communication system as claimed in claim 3,

wherein said user device (6, 7) further comprises:

- an RF transmitter (61) for emitting RF signals,
- a detector (62) for detecting RF signals or RF signal modulations of emitted RF

signals,

- a processor (63) for processing the detected RF signals or RF signal modulations and for deriving user settings and/or commands embedded therein.

5. RF communication system as claimed in claim 1, wherein said passive data carrier (3, 4, 5) is adapted for storing a number of different sets of user settings and/or commands for control of different types or selected user devices (6, 7).

6. RF communication system as claimed in claim 1, comprising a plurality of passive data carriers (3, 4, 5) positioned at different locations for control of user devices (6, 7) present in respective control areas around said different locations according to stored user settings and/or commands.

7. RF communication method for control of user devices via a wireless RF communication comprising the steps of:

- automatically programming a passive data carrier via a wireless RF communication with actual user settings and/or commands of a user device, said passive data carrier including a memory for storing said user settings and/or commands,
- reading user settings and/or commands from said passive data carrier via a wireless RF communication, and
- controlling the user device according to read user settings and/or commands.

8. User device for use in a RF communication system as claimed in claim 1 for reading user settings and/or commands from a passive data carrier (3, 4, 5) via a wireless RF communication, comprising:

- an RF transmitter for emitting RF signals,
- a programming unit (65) for automatically programming said passive data carrier (3, 4, 5) via said RF signals with actual user settings and/or commands of the user device (6, 7),
- a detector (62) for detecting RF signals or RF signal modulations of the emitted RF

signals from said data carrier,

- a processor (63) for processing the detected RF signals or RF signal modulations and for deriving user settings and/or commands embedded therein, and
- a controller (64) for controlling the user device (6) according to read user settings and/or commands.

9. Passive, via a wireless RF communication programmable and readable data carrier for use in a RF communication system as claimed in claim 1 comprising:

- a memory (31) for storing user settings and/or commands,
- a receiving means (32) for receiving RF signals,
- a processing means (34) for processing said received RF signals to obtain user setting and/or commands embedded therein and/or for embedding stored user settings and/or commands into output RF signals or RF signal modulations of said received RF signals, and
- an output means (33) for outputting said output RF signals or RF signal modulations.

ABSTRACT

RF communication system and method

The present invention relates to an RF communication system and method for control of user devices via wireless RF communication. In order to provide a flexible use and a number of different applications and, in particular, in order to avoid the need for training user devices beforehand, an RF communication system is proposed comprising:

- a user device (6, 7) for reading user settings and/or commands from a passive data carrier (3, 4, 5) via a wireless RF communication including a controller (64) for controlling the user device (6) according to read user settings and/or commands and a programming unit (65) for automatically programming said passive data carrier (3, 4, 5) via a wireless RF communication with actual user settings and/or commands of the user device (6, 7), and
- a passive, via a wireless RF communication programmable and readable data carrier (3, 4) including a memory (31) for storing user settings and/or commands.

(Fig. 1)

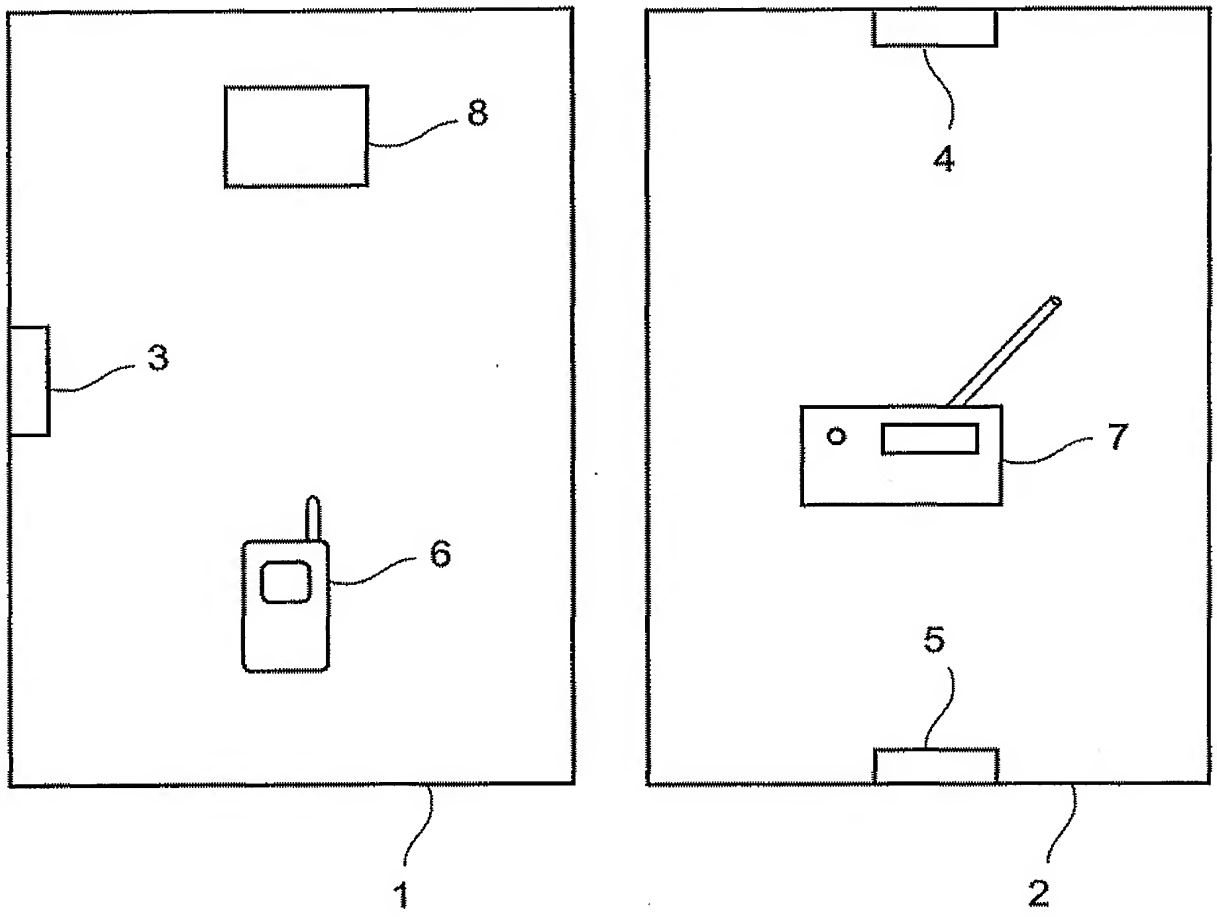

Fig.1

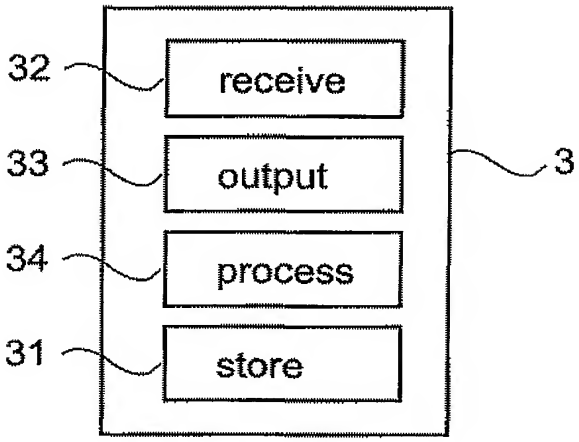

Fig.2

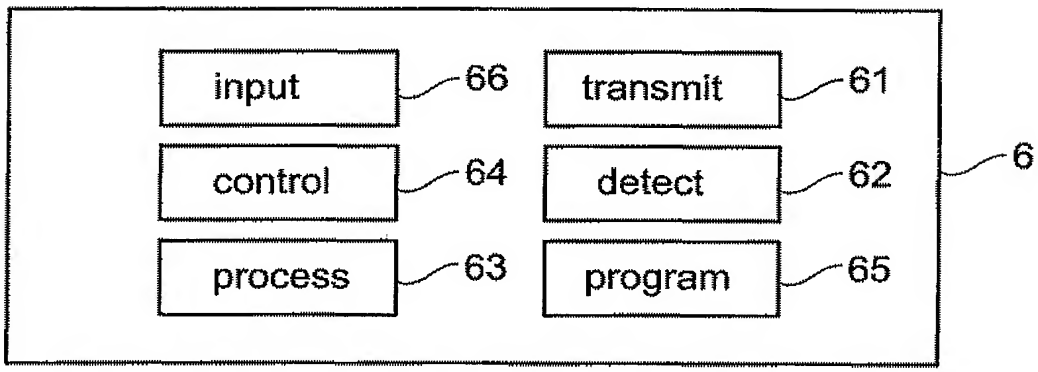

Fig.3

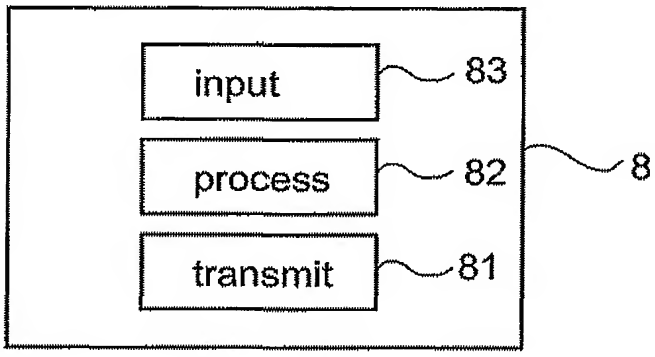

Fig.4